

**DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**PERMITTING and COMPLIANCE DIVISION**  
**MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM**  
**(MPDES)**

**Statement of Basis (SOB)**

Permittee:	Dawson County West Glendive Sewer Lagoon
Permit No.:	MT0021733
Receiving Water:	Yellowstone River
Facility Information:	
Name	Community of West Glendive Wastewater Treatment Plant
Location	102 Highway 16
Facility Contact:	Kelly Pulse West Glendive Public Works Director 207 West Bell Glendive, MT 59330  406-377-4807
Fee Information:	
Number of Outfalls	1
Outfall – Type	001-Minor POTW

## I. Permit Status

The existing MPDES permit was issued on December 16, 1999 and expired on February 28, 2004. The permittee submitted an Environmental Protection Agency (EPA) 2A application on January 22, 2004. On October 16, 2007 the Department requested that the facility update the application by completing a DEQ Form 1 and an EPA Form 2A. The updated application was received on November 7, 2007. The application was considered complete and the permit was administratively extended on November 14, 2007.

## II. Facility Information

### A. Facility Description

The Community of West Glendive Wastewater Treatment Plant (West Glendive WWTP) consists of a two-cell facultative lagoon with additional aeration provided by pumping water from cell 1 to cell 2 through an aeration trough. Cell 1 is 9.9 acres and cell 2 is 21.1 acres in size. Wastewater from the south side of the county enters a distribution (splitter) box which allows the operator to control the influent into cell 1 or cell 2. Wastewater from the flush tank, a non-mechanical wet well that uses gravity and air pressure to force sewage from the Highland Park subdivision (west of Highway 16 and north of Interstate 94) to the lagoon, enters the lagoon on the north side of cell 2. Approximately 85% of the total influent flow is through the distribution box and 15% of the flow is from the flush tank [personal communication with West Glendive Public Works Director (West Glendive PWD) on August 12, 2008]. Influent samples can be obtained at both the distribution box and flush tank. Effluent is discharged to a manmade ditch from the northeastern corner of cell 1 through a 12" buried PVC pipe that surfaces east of the lagoon. The manmade ditch, which was constructed by the permittee to convey the discharge to a side channel of the Yellowstone River, flows about 150 feet north before it empties into the side channel. The lagoon is located in a 100-year flood plain of the Yellowstone River.

The average design flow of the West Glendive WWTP is 0.275 million gallons per day (mgd). A controlled discharge usually occurs in May and November each year for about 16-30 days. Table 1 summarizes the current design criteria for the facility.

Based on a June 26, 2002 MPDES inspection report, the facility maintains 10.5 miles of collection lines. Most of the collection system is approximately 45 years old. Two pump stations pump wastewater to the splitter box.

The facility accepts 90-100 1,000 gallon septage loads from local septic tank pumpers (see Section II.D) each year.

Sludge has never been removed from lagoon cells 1 or 2. There is a buildup of sludge around the distribution box influent lines in both cells [personal communication with West Glendive PWD on August 5, 2008].

**Table 1. Current Design Criteria Summary – West Glendive WWTP**

Facility Description:	
Two cell facultative lagoon with aeration trough between the two cells.	
Construction Date: 1959	Modification Date: 1967 (added 21.1 acre cell)
Design Year: 2000	(left blank)
Design Population: 3,100	Population Served: 1,900
Design Flow Average (mgd): 0.275	Design Flow, Peak (mgd): unknown
Primary Cells: one (9.1 acres)	Secondary Cells: one (21.1 acres)
Minimum Detention Time (System) (days): unknown	
Design BOD <sub>5</sub> Removal (%): unknown	Design Load (lb/day): 527
Design SS Removal (%): unknown	Design Load (lb/day): 620
Collection System: separate	
SSO Events (Y/N): N	Number:
Bypass Events (Y/N): N	Number:
Inflow Flow (mgd): 0.05-0.075	Source: man hole covers, sewer risers
Disinfection: none	Type:
Discharge Method: controlled twice/year (spring and fall)	
Effluent Flow Primary Device: none, calculated using surface water area and water elevation changes.	
Recording Device: none	
Sludge Storage: none	
Sludge Disposal: none	EPA Biosolids Permit Authorization: none

#### B. Effluent Characteristics

Table 2 summarizes monthly self-monitoring effluent data reported by the West Glendive WWTP during the period of record (POR) January 2002 through August 2007.

<b>Table 2: Effluent Characteristics <sup>(1)</sup> for the Period January 2002 through August 2007.</b>							
Parameter	Location	Units	Existing Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	mgd	<sup>(6)</sup>	0.53	1.39	1.04	11
Biochemical Oxygen Demand (BOD <sub>5</sub> )	Influent	mgd	<sup>(6)</sup>	--	--	--	--
	Effluent	mg/L	65/45 <sup>(5)</sup>	9	24	17	11
	NA	% removal	65	--	--	--	--
	Effluent	lb/day	69 <sup>(8)</sup>	--	--	--	--
Total Suspended Solids (TSS)	Influent	mg/L	<sup>(6)</sup>	--	--	--	--
	Effluent	mg/L	135/100 <sup>(5)</sup>	10.6	57.2	31.9	11
	NA	% removal	<sup>(7)</sup>	--	--	--	--
	Effluent	lb/day	230 <sup>(8)</sup>	--	--	--	--
<i>E.coli</i> Bacteria <sup>(2), (3)</sup>	Effluent	cfu/100ml	<sup>(7)</sup>	--	--	--	--
pH	Effluent	s.u.	6.0-9.0	--	--	--	--
Temperature	Effluent	°C	<sup>(7)</sup>	--	--	--	--
Chlorine, Total Residual	Effluent	mg/L	<sup>(7)</sup>	--	--	--	--
Total Ammonia, as N, winter <sup>(4)</sup>	Effluent	mg/L	<sup>(6)</sup>	6.6	12.9	9.2	6
Total Ammonia, as N, summer <sup>(4)</sup>	Effluent	mg/L	<sup>(6)</sup>	9.1	15.6	11.2	6
Total Kjeldahl Nitrogen	Effluent	mg/L	<sup>(6)</sup>	9.8	17.5	14.2	11
Nitrate + Nitrite, as N	Effluent	mg/L	<sup>(6)</sup>	0.1	1.9	0.4	11
Total Nitrogen	Effluent	mg/L	<sup>(6)</sup>	9.8	17.5	14.5	11
		lb/day	87 <sup>(8)</sup>	--	--	--	--
Total Phosphorus as P	Effluent	mg/L	<sup>(6)</sup>	0.9	10	3.8	11
		lb/day	22 <sup>(8)</sup>	--	--	--	--
Dissolved Oxygen	Effluent	mg/L	<sup>(7)</sup>	--	--	--	--
Oil and Grease, visual	Effluent	mg/L	10	0	0	0	10
Total Dissolved Solids	Effluent	mg/L	<sup>(7)</sup>	--	--	--	--
Footnotes:							
(1) Conventional and nonconventional pollutants only, table does not include toxics.							
(2) Sample period is April 1 through October 31.							
(3) Geometric mean.							
(4) Winter period is November 1 through March 31; Summer period is April 1 through October 31.							
(5) Weekly average/Monthly average.							
(6) No limit in existing permit; monitoring requirement only.							
(7) No monitoring or effluent limit in existing permit.							
(8) Nondegradation Annual Average Load Value - not a permit limit.							

Table 3 summarizes intermittent discharge flow data for the POR. Discharge flow rates exceed the design flow of 0.275 mgd for the facility.

<b>Table 3: Summary of Discharge Flow Data in mgd From January 2002 through August 2007</b>						
Month	2002	2003	2004	2005	2006	2007
	30-day Average	30-day Average	30-day Average	30-day Average	30-day Average	30-day Average
January	--	--	--	--	--	--
February	--	--	--	--	--	--
March	--	--	--	--	--	--
April	--	--	--	--	--	--
May	1.22	1.39	0.87	1.08	1.34	1.17
June	--	--	--	--	--	--
July	--	--	--	--	--	--
August	--	--	--	--	--	--
September	--	--	--	--	--	--
October	--	--	--	--	--	--
November	0.53	0.83	0.91	1.07	1.03	--
December	--	--	--	--	--	--
<b>Maximum</b>	1.22	1.39	0.91	1.08	1.34	1.17
<b>Minimum</b>	0.53	0.83	0.87	1.07	1.03	1.17

#### C. Compliance History

No violation letters, during the POR or during any other period, were noted in the administrative file.

#### D. Inspection Results

A July 6, 2006 inspection by the Department noted that the practice of allowing septic pumper trucks to dump septage into the lagoon should be reviewed to ensure the system can handle shock loads and to verify that contractors are assessed a fair share of the expenses related to the long term operation and maintenance of the West Glendive WWTP. The Department strongly recommended that the facility not accept septage and other high-strength waste loads. During a follow up inspection on November 8, 2007 the West Glendive PWD explained that Dawson County is controlling the time and place where the contractor dumps septage into the lagoon and is also charging more for the service. The septage contractor is also required to submit periodic reports to the county.

A November 8, 2007 inspection report noted that the surface area and measured elevation changes of the lagoon cells are used to estimate effluent flow because there is no primary flow measuring device at the effluent structure.

### III. Technology-based Effluent Limits (TBELs)

#### A. Scope and Authority

The Montana Board of Environmental Review has adopted by reference 40 CFR 133 which define minimum treatment requirements for secondary treatment, or the equivalent, for publicly owned treatment works (POTW) (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by Biochemical Oxygen Demand (BOD<sub>5</sub>), Total Suspended Solids (TSS), percent removal of BOD<sub>5</sub> and TSS, and pH.

These requirements may be modified on a case-by-case basis for facilities that are eligible for treatment equivalent to secondary (TES) treatment [40 CFR 133.101(g)] or alternative state requirements (ASR) for TSS. To determine if a facility is eligible for TES the facility must meet the requirements of 40 CFR 133.101(g) as follows:

- 1) The BOD<sub>5</sub> and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum effluent quality described for secondary treatment (40 CFR 133.102),
- 2) The treatment works utilize a trickling filter or waste stabilization pond, and
- 3) The treatment works utilizes biological treatment that consistently achieves a 30-day average of at least 65 percent removal [40 CFR 133.101(k)].

Water quality must not be adversely affected by the application of equivalent to secondary treatment. Effluent limits for BOD<sub>5</sub> cannot be relaxed unless the permittee has demonstrated that the relaxed limits will not result in a violation of water quality standards in the receiving water.

In addition to TES, permitting agencies may give special consideration to treatment works that employ waste stabilization ponds as the primary method for treating wastes. ASR may be incorporated into permits for lagoons if historic data for the system indicates that effluent limits based on TES cannot be achieved. The 30-day ASR for TSS in Montana is 100 mg/L [49 FR 37005; September 20, 1984]; the Department employed a 135 mg/L TSS for a 7-day limit based on best professional judgment. New facilities are not eligible for ASR.

The proposed TBELs satisfying the requirements of ARM 17.30.1209 are given in Table 4. These limits are based on:

1. In the existing permit, the West Glendive WWTP met the criteria under 40 CFR 133.101(g) for BOD<sub>5</sub> TES limits. The effluent limits for BOD<sub>5</sub> in the existing permit were a 7-day average of 65 mg/L, a 30-day average of 45 mg/L and 65% removal for BOD<sub>5</sub>. The facility is not eligible for TES limits in this permit because BOD<sub>5</sub> concentrations do not exceed the minimum level of effluent

quality in 40 CFR 133.102(a) and (b) [40 CFR 133.101(g)] during the POR. BOD<sub>5</sub> limits in this permit will be reduced to a 7-day average of 45 mg/L, a 30-day average of 30 mg/L and 85% removal for BOD<sub>5</sub> because data shows that the facility can consistently achieve these limits through proper operation and maintenance. (For the POR, the average BOD<sub>5</sub> concentration is 17 mg/L and the 95<sup>th</sup> percentile is 22 mg/L).

2. In the existing permit, the West Glendive WWTP met the criteria under 40 CFR 133.101(g) for TES TSS limits. The effluent limits for TSS in the existing permit are 135 mg/L for a weekly average and 100 mg/L for a monthly average. No percent removal for TSS was included in the existing permit. The TSS ASR limits are reduced in this permit to TES limits. TES limits are: 7-day average of 65 mg/L, 30-day average of 45 mg/L, and 65% removal for TSS. TSS limits are reduced in this permit to TES limits because data shows that the facility can consistently achieve these limits through proper operation and maintenance (For the POR, the average TSS concentration is 32 mg/L and the 95<sup>th</sup> percentile is 56 mg/L).

ARM 17.30.1345 [40 CFR 122.45(f)(1)] requires that effluent limits must be expressed in terms of mass (mass/time), except for certain parameters, such as pH or temperature. For municipal treatment plants, mass-based limits are based on design flow (discussed in Part II) of the facility.

Mass-based limits are calculated as follows:

Load (lb/day) = Design Flow (mgd) x Concentration (mg/L) x Conversion Factor (8.34)

BOD:

30-d	Load = 0.275 mgd x 30 mg/L x 8.34	=	69 lb/day
7-d	Load = 0.275 mgd x 45 mg/L x 8.34	=	103 lb/day

TSS:

30-d	Load = 0.275 mgd x 45 mg/L x 8.34	=	103 lb/day
7-d	Load = 0.275 mgd x 65 mg/L x 8.34	=	149 lb/day

Proposed mass-based TBELs for BOD<sub>5</sub> and TSS are listed in Table 4.

Table 4. Technology-based Effluent Limits				
Parameter	Units	Average Monthly Limit <sup>1</sup>	Average Weekly Limit <sup>1</sup>	Rationale
BOD <sub>5</sub>	mg/L	30	45	40 CFR 133.102(a)
	lb/day	69	103	
	% removal	85 <sup>2</sup>	--	
TSS	mg/L	45	65	40 CFR 133.105(b)
	lb/day	103	149	
	% removal	65 <sup>3</sup>	--	
pH	s.u.	6.0-9.0 (instantaneous)		40 CFR 133.105 (c)
1. See Definitions section at end of permit for explanation of terms. 2. The arithmetic mean of the values for BOD <sub>5</sub> for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (85% removal). 3. The arithmetic mean of the values for TSS for effluent samples collected in a period of 30 consecutive days shall not exceed 35% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (65% removal).				

## B. Nondegradation

The provisions of ARM 17.30.701, *et seq.* (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit, or as determined from a permit previously issued by the Department, are not considered new or increased sources.

In the previous Statement of Basis (SOB), the Department calculated mass-based load values for BOD<sub>5</sub>, TSS, total nitrogen and total phosphorus (Nondegradation Threshold Values, January 27, 1999, Table 5). Any increase above this amount is subject to the provisions of the Nondegradation Policy (75-5-303, MCA). The permittee was not required to report load data for these parameters during the POR so a comparison of the nondegradation loads to actual loads can not be made. The discharge does not constitute a new or increased source for the purposes of Montana Nondegradation requirements.

Table 5. Nondegradation Loads

Parameter	Allocated Load (lb/day)
BOD <sub>5</sub>	69
TSS	230
Nitrogen	87
Phosphorus	22

#### IV. Water Quality-based Effluent Limits

##### A. Scope and Authority

Permits are required to include water quality-based effluent limits (WQBEL) when technology-based effluent limits are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any state water quality standards. Montana water quality standards (ARM 17.30.601, *et seq.*) define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. New sources, as defined in ARM 17.30.703(16), are subject to Montana Nondegradation Policy (75-5-303, MCA) and regulations (ARM 17.30.701, *et. seq.*).

##### B. Receiving Water

Wastewater is discharged from the West Glendive WWTP through a manmade drainage ditch that flows to a side channel of the Yellowstone River and then enters the mainstem approximately 1.5 miles north of the sewer lagoon. The 150 foot long manmade drainage ditch was constructed by the permittee to convey water from the 12-inch discharge pipe to the side channel of the Yellowstone River. The flow rate of the side channel is unknown. The side channel flows along the west side of a wetland area. "During most years there is water in the side channel and wetland all year, except during the last three hot summers the water dried up. In 1994 during a high spring run off year, the side channel received flow from the Yellowstone River mainstem" (personal communication with West Glendive PWD, August 5, 2008). The Yellowstone River mainstem is located approximately ½ mile east of the sewer lagoon.

The receiving water is classified as B-3 according to Montana Water Use Classifications [ARM 17.30.611(1)(c)(i)]. B-3 waters are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

The B-3 classification for the receiving water is consistent with the previous Statement of Basis (SOB). However, the previous SOB specified the receiving water as the "Yellowstone River in the area of discharge". The actual receiving water is the side channel of the Yellowstone River that enters the mainstem approximately 1.5 miles north of the sewer lagoon.

Water quality standards and beneficial uses apply at the point where the man-made ditch enters the side channel of the Yellowstone River.

The receiving water is considered high quality water pursuant to Montana's Nondegradation Policy and degradation of high quality water is not allowed unless authorized by the Department under 75-5-303(3), MCA.

The Yellowstone River is located within the lower Yellowstone watershed as identified by United States Geological Survey (USGS) Hydrological Unit Code (HUC) 10100004. The Yellowstone River in the vicinity of the discharge is on the 1996 303(d) list of impaired streams as impaired for metals, nutrients, other habitat alterations, pathogens, salinity, total dissolved solids, chlorides, suspended solids and pH. The probable sources of impairment are agriculture, irrigated crop production, municipal point sources, natural sources, range land and stream bank modification/destabilization.

The Yellowstone River in the vicinity of the discharge is on the 2006 303(d) list as impaired for fish passage. The probable source of impairment is dam construction (lower Yellowstone irrigation diversion dam at Intake). No total maximum daily limit (TMDL) has been established for this segment of the Yellowstone River.

### C. Applicable Water Quality Standards

Discharges to surface waters classified B-3 are subject to the specific water quality standards of ARM 17.30.625 (March 31, 2006), Department Circular DEQ-7 (February 2006), as well as the general provisions of ARM 17.30.635 through 637. In addition to these standards, dischargers are also subject to ARM 17.30 Subchapter 5 (Mixing Zones, November 2004) and Subchapter 7 (Nondegradation of Water Quality, June 30, 2004).

ARM 17.30.635(4) requires that the design condition for disposal systems must be based on the 7-day average flow of the receiving water which is expected to occur on average once in 10-years (7Q10). More restrictive requirements may be necessary due to specific mixing zone requirements.

### D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded [ARM 17.30.502(6)]. The Department must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)].

In accordance with ARM 17.30.517(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also comply with the general prohibitions of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

- (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- (c) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

- (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- (e) create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in the mixing zone, an effluent in its mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions [ARM 17.30.602(16)]. No mixing zone will be granted that will impair beneficial uses [ARM 17.30.506(1)]. Acute standards may not be exceeded in any part of the mixing zone [ARM 17.30.507(1)(b)]. Aquatic life chronic, aquatic life acute and human health standards may not be exceeded outside of the mixing zone [ARM 17.30.507(1)(a)].

A standard mixing zone may be granted for facilities which discharge less than 1 million gallons per day (mgd) or when mixing is nearly instantaneous [ARM 17.30.516(d)]. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or the permittee demonstrates through a Department approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) river widths. Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone in accordance with ARM 17.30.518 and must conform to the requirements of 75-5-301(4), MCA which states that mixing zones must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for the Department to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

Best Professional Judgment was used to define the mixing zone in the existing permit because there were no available field data. The mixing zone was defined as “a segment of the Yellowstone River extending from the facility outfall, downstream through an abandoned stream channel to the main channel of the river and ½ mile farther to a point in the NE¼ of Section 24, Township 16 N, Range 55 E”. This mixing zone is inappropriate because the receiving stream is an old side channel of the Yellowstone River, not the Yellowstone River mainstem. In addition, no proposed effluent limits proposed in this permit require a mixing zone. Therefore, no mixing zone will be granted for the discharge.

#### E. Basis for WQBEL (Reasonable Potential and Calculations)

Pollutants typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include conventional pollutants such as biological material (measured by BOD<sub>5</sub>), suspended solids, oil & grease, *Escherichia coli* (*E. coli*) bacteria and pH and non-conventional pollutants such as chlorine, ammonia, phosphorus and nitrogen.

Effluent limits are required for all pollutants which demonstrate a reasonable potential (RP) to exceed numeric or narrative standards. The Department uses a mass balance equation to determine reasonable potential based on *EPA Technical Support Document for Water Quality-based Toxics Control (TSD)* (EPA/505/2-90-001). Input parameters are

based on receiving water concentration; maximum projected effluent concentration and design flow of the wastewater treatment facility, and the applicable receiving water flow.

The Department uses a mass balance equation to determine RP (*Equation 1*).

$$C_{RP} = \frac{C_E Q_E + C_S Q_S}{Q_E + Q_S} \quad (Eq. 1)$$

Where:

$C_{RP}$  = receiving water concentration (RWC) after mixing, mg/L  
 $C_E$  = maximum effluent concentration, mg/L  
 $C_S$  = RWC upstream of discharge, mg/L  
 $Q_S$  = applicable receiving water flow, cfs  
 $Q_E$  = facility design flow rate, cfs

#### 1. Conventional Pollutants

The facility provides a significant reduction in biological material and solids through secondary treatment (Section III). In addition, the proposed TBELs in this permit are more stringent than the existing permit. No additional WQBEL will be required for these parameters (BOD<sub>5</sub>, TSS and pH).

**Oil and Grease** - The effluent limit for oil and grease of 10 mg/L in the existing permit will remain in this permit. The existing permit required monthly visual monitoring and if a sheen was detected, an oil and grease sample was required to be analyzed. The existing oil and grease effluent limit and visual monitoring requirement will remain in this permit and an oil and grease sample will be required to be analyzed twice each year.

***Escherichia coli* (*E. coli*) Bacteria** - There were no effluent limits for pathogens in the existing permit. This permit identifies pathogen limits to protect public health. Montana water quality standards were revised to replace fecal coliform bacteria with *E. coli* to reflect the latest federal guidance. The applicable standards for *E. coli* bacteria are:

April 1 through October 31 of each year - the geometric mean number of *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (ml) and 10% of the total samples may not exceed 252 cfu per 100 ml during any 30-day period [ARM 17.30.629(2)(a)]; and

November 1 through March 31 of each year - the geometric mean number of *E. coli* must not exceed 630 cfu per 100 ml and 10% of the total samples may not exceed 1,260 cfu per 100 ml during any 30-day period [ARM 17.30.625(2)(a)(ii)].

ARM 17.30.637(1)(d) requires that state waters, including mixing zones, be free from substances which create concentrations or combinations of materials which are toxic or harmful to humans. These effluent limits apply at the end of the discharge pipe. Since there is no pathogen effluent data available, RP can not be assessed and *E. coli* monitoring will be required.

*E. coli* limits in this SOB will not be included in this permit because the West Glendive WWTP will need to evaluate significant upgrades to comply with ammonia limits during the next permit cycle (see below) so it is reasonable to allow the facility time to plan, design, finance and construct a facility considering all new permit limits simultaneously. The proposed *E. coli* limits will remain in this SOB and provide a basis for *E. coli* limits during the next permit cycle.

## 2. Non-conventional Pollutants

Total Residual Chlorine (TRC): - The facility does not currently have disinfection capabilities and there is no TRC limit in effect. The facility may need to install disinfection equipment to meet future pathogen limits. In the event chlorination is used as a means of disinfection, the chlorine effluent limits in this permit will be an average monthly limit of 0.011 mg/L (chronic) and 0.019 mg/L (acute) for a daily maximum limit. These limits apply at the end of the discharge pipe [ARM 17.30.637(1)(d)]. TRC limits do not apply if ultra-violet (UV) light is utilized for disinfection.

TRC limits discussed in this SOB will not be included in this permit because the West Glendive WWTP will need to evaluate significant upgrades to comply with ammonia limits during the next permit cycle (see below) so it is reasonable to allow the facility time to plan, design, finance and construct a facility considering all new permits limits simultaneously. The TRC limits will remain in this SOB and provide a basis for TRC limits during the next permit cycle.

Total Ammonia-N: - Total Ammonia-N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. The Yellowstone River, as well as the side channel of the Yellowstone River that receives the effluent discharge from the West Glendive WWTP, is a warm water fishery without salmonids present.

Since there is a lack of flow, pH and temperature data for the side channel of the Yellowstone River, Yellowstone River data and an estimate of the flow in the side channel will be used to estimate ammonia effluent limits. The purpose for the estimated ammonia limits is to assist the permittee in future planning for the West Glendive WWTP.

In the absence of water quality data for the side channel of the Yellowstone River, water quality data from the Yellowstone River mainstem is used to establish ammonia effluent limits. This data is from the downstream USGS gauging station at Sidney (USGS station 06329500). It is reasonable that water quality data from the Yellowstone River at this gauging station is similar to the water quality of the side channel of the Yellowstone River because these water bodies are likely hydraulically connected most or part of the year. It is unlikely that the discharge from the West Glendive WWTP greatly influences ammonia data at this river gauging station because the dilution ratio is  $1,360 \text{ cfs} / 1.8 \text{ cfs} = 755:1$ . In addition, the background river concentration of ammonia (0.04 mg/L) at the Sidney gauging station is similar to the background river concentration of ammonia (0.04 mg/L) at the USGS gauging station (06214500) in Billings.

Appendix I lists water quality parameters from USGS gauging station number 06329500 for determining ammonia water quality standards in the side channel of the Yellowstone River. Appendix II summarizes total ammonia-N water quality standards for the side channel of the Yellowstone River.

RP to exceed the chronic and acute water quality standards for total ammonia-N in Table 6 were assessed using *Equation 1*, where:

$C_{RP}$  = receiving water concentration (RWC) after mixing, mg/L  
 $C_E$  = maximum observed effluent concentration, 15.6 mg/L  
 $C_S$  = RWC upstream of discharge, 0.04 mg/L  
 $Q_S$  = estimated receiving water flow, cfs, 5 (100% chronic): 0.5 (10% acute)  
 $Q_E$  = applicable facility design flow rate, 1.8 cfs

$$C_{RP} = \frac{(1.8 * 15.6) + (0.04 * 5)}{(1.8 + 5)} = 4.2 \text{ mg/L}$$

If the flow of the side channel of the Yellowstone River is assumed to be 5 cfs, the resulting RP value is greater than the chronic and acute ammonia standards in Appendix II so RP exists for ammonia. This is a conservative flow estimate because typically there is very little flow in the side channel. Based on the estimated flow of the side channel, estimated ammonia limits are calculated in Appendix III using the EPA Technical Support Document approach. The average monthly ammonia limit is 1.1 mg/L; the maximum daily ammonia limit is 1.5 mg/L. The calculated monthly ammonia limit exceeds the chronic water quality standard for the summer period but not for the winter period.

Ammonia limits calculated in this SOB will not be included in this permit because the West Glendive WWTP is not capable of removing ammonia to these levels and the process for upgrading the facility is outside the scope of this five (5) year permit cycle. This permit will include a special conditions/compliance schedule requiring the City to evaluate upgrades, including but not limited to, land application, piping to the Yellowstone River and increased aeration or other treatment, to achieve compliance with the proposed ammonia limits. The proposed ammonia effluent limits will remain in this SOB and provide a basis for ammonia limits during the next permit cycle.

Nutrients (Total Nitrogen and Total Phosphorus): The Yellowstone River segment at Glendive is listed on the 1996 303(d) list as impaired for nutrients (nitrogen and phosphorus). There is insufficient effluent data (less than three years of monthly data) to calculate nitrogen and phosphorus effluent limits in this permit. Monitoring for these pollutants will be required in this permit to collect the necessary data to calculate nitrogen and phosphorus limits during the next permit cycle. (Interim Guidance for Developing Nutrient Limitations in MPDES permits for Listed or Impaired Water Bodies, May 7, 2006).

### 3. Whole Effluent Toxicity (WET)

Whole Effluent Toxicity - ARM 17.30.637(1)(d) requires that state surface waters be "free from" substances attributable to municipal, industrial or agricultural discharges that will create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life". Federal rule requires that permits include enforceable limits for whole effluent toxicity when the discharge causes, or has the RP to cause toxicity in the receiving water (40 CFR 122.44). The Department implements the general prohibition of 637(1)(d) using whole effluent toxicity testing (40 CFR 136). Implementation guidelines and the Department's toxic control strategy for whole effluent toxics control are given in Region VIII NPDES Whole Effluent Toxics Control Program (EPA, August 1997, page 8).

The Department finds there may be RP for the wastewater discharge to cause toxicity in the receiving water based on the following factors: 1) the facility accepts 90-100 1,000 gallon septic truck loads each year from unknown sources that may contain potential pollutants (July 6, 2006 inspection letter); 2) inadequate characterization of effluent (insufficient data on metals, VOCs and other potential toxicants); and 3) intermittent nature of discharge.

The Department may require publicly owned treatment works (POTW) to submit results of toxicity tests with their permit applications based on the variability of the pollutants or pollutant parameters in the POTW effluent [ARM 17.30.1322(6)(j)(i)]. However, no WET testing has been conducted by the permittee. Therefore, this permit will require WET testing but no WET effluent limit will be included in the permit. The failure of a WET test will not be a violation of the permit but the Department may require a Toxicity Reduction Evaluation / Toxicity Identification Evaluation (TRE/TIE) to determine the source of failure.

Starting in the first calendar quarter of 2010, the permittee shall conduct an acute static replacement toxicity test on a composite sample of the effluent and a grab sample of the receiving water until a total of four (4) tests are completed during the five year permit cycle. Standard WET testing language will be included in the permit.

#### IV. Proposed Effluent Limits

Effluent limits apply at the end of 12-inch effluent pipe until a primary flow measuring device is installed at which time effluent limits apply immediately after the primary flow measuring device.

##### A. Final Effluent Limits

<b>Effluent Limitations</b>					
Parameter	Units	Effluent Limitations			
		Average Monthly Limit <sup>1</sup>	Average Weekly Limit <sup>1</sup>	Maximum Daily Limit <sup>1</sup>	Instantaneous Maximum Limit <sup>1</sup>
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	30	45	--	--
	lb/day	69	103	--	--
BOD <sub>5</sub> Removal	%	85	--	--	--
Total Suspended Solids (TSS)	mg/L	45	65	--	--
	lb/day	103	149	--	--
TSS Removal	%	65	--	--	--
Oil and grease	mg/L	--	--	--	10
Footnotes: 1. See definition in permit.					

pH: Effluent pH from Outfall 001 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum) unless a variation is due to natural biological processes. For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

#### V. Monitoring Requirements

##### A. Influent/Effluent Monitoring

Effluent samples must be obtained at the end of the 12-inch effluent pipe until a primary flow measuring device is installed at which time effluent samples must be obtained at the primary flow measuring device (by June 1, 2010 or before)(see special conditions/compliance schedule).

Flow proportional samples must be obtained at both the distribution (splitter) box and flush tank and combined before sample parameters are analyzed.

Monitoring Requirements				
Parameter	Unit	Sample Location	Sample Frequency	Sample Type <sup>1</sup>
Flow	mgd	Effluent	1/Day	Instantaneous <sup>2</sup>
5-Day Biological Oxygen Demand (BOD <sub>5</sub> )	mg/L	Influent	1/Week	Grab
	mg/L	Effluent	1/Week	Grab
	% Removal <sup>4</sup>	Effluent	1/Month	Calculated
	lb/day	Effluent	1/Week	Calculated
Total Suspended Solids (TSS)	mg/L	Influent	1/Week	Grab
	mg/L	Effluent	1/Week	Grab
	% Removal <sup>4</sup>	Effluent	1/Month	Calculated
	lb/day	Effluent	1/Week	Calculated
pH	s.u.	Effluent	1/Week	Instantaneous
<i>E. coli</i>	cfu/100ml	Effluent	1/Month	Grab
Temperature	°C	Effluent	1/Month	Instantaneous
Oil and Grease	mg/L	Effluent	2/Year	Grab
Total Ammonia as N	mg/L	Effluent	1/Month	Grab
Nitrate + Nitrite, as N	mg/L	Effluent	1/Month	Grab
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Month	Grab
Total Nitrogen <sup>3</sup>	mg/L	Effluent	1/Month	Calculated
	lb/day	Effluent	1/Month	Calculated
Total Phosphorus as P	mg/L	Effluent	1/Month	Grab
	lb/day	Effluent	1/Month	Calculated
Whole Effluent Toxicity, Acute <sup>5</sup>	% Effluent	Effluent	1/Quarter	Composite
Footnotes:				
1. See Definition section at end of permit for explanation of terms. 2. The permittee will continue to estimate flow using the lagoon surface area and elevation changes until the primary flow measuring device is installed (by June 1, 2010). 3. Calculated as the sum of Nitrate + Nitrite as N, and Total Kjeldahl Nitrogen concentration. 4. Percent (%) Removal shall be calculated using the monthly average values. 5. Required 1/Quarter starting in 2010 until a total of 4 WET tests are completed this 5-year permit cycle.				

<b>Monitoring Requirements (Continued)</b>				
Parameter	Unit	Sample Frequency <sup>3</sup>	Sample Type <sup>1</sup>	ML
Arsenic, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1.0
Cadmium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	0.1
Chromium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	10.0
Copper, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1.0
Lead, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1.0
Mercury, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	0.1
Selenium, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1.0
Silver, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	1.0
Zinc, Total Recoverable <sup>2</sup>	µg/L	2/Year	Composite	10.0
Hardness (as CaCO <sub>3</sub> )	mg/L	2/Year	Grab	10.0
Footnotes: 1. See Definition section at end of permit for explanation of terms. 2. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent. 3. Sampling required only in second and third calendar years after the effective date of the permit.				

## B. Sludge Requirements

The facility is not authorized to dispose of sludge under the EPA Region VIII General Biosolids permit. This permit will contain a requirement in the special conditions/compliance schedule to measure and remove sludge from the lagoon cells, if necessary, and standard conditions requiring authorization under the EPA General Biosolids permit for any removal of sludge/biosolids from the lagoon system.

## C. Pretreatment Program

The facility is not currently operating under the EPA Pretreatment Program. The permit will include standard language restricting introducing certain pollutants to the West Glendive WWTP and requiring the facility to provide adequate notice to the Department if a new source, volume or character of industrial pollutant is introduced to the system.

## VI. Nonsignificance Determination

The nondegradation loads calculated in the existing permit will remain in the renewal permit so the discharge from the West Glendive WWTP does not constitute a new or

increased source of pollutants pursuant to ARM 17.30.702(18) and a nonsignificance analysis is not required [ARM 17.30.705(1)].

## VII. Special conditions/Compliance Schedule

### A. Effluent Flow Measurement

The facility lacks an adequate device to measure effluent flow. A primary effluent flow measuring device must be installed by June 1, 2010.

Authority: ARM 17.30.1342(10)(a) and 75-5-602(3), MCA:

This rule and statute require that samples taken for the purpose of monitoring must be representative of the monitored activity and the owner or operator of a facility must install, use and maintain monitoring equipment to effectively monitor the discharge.

### B. Sludge

The permittee must monitor and remove sludge in the lagoon cells, if necessary. The permittee must submit a letter documenting this work has been completed by June 1, 2010.

Authority: ARM 17.30.1342(5) and 75-5-605(1)(b), MCA:

This rule and statute require that facilities properly operate and maintain the facility.

### C. Ammonia, *E.coli* and TRC Effluent Limitations

The facility can not achieve the proposed ammonia limits in this SOB so these limits will not be included in this permit. The facility must evaluate technologies and options to achieve ammonia limits during this permit cycle, including but not limited to, land application, piping the discharge to the Yellowstone River and increased aeration.

The permittee is required to submit plans and schedules by December 31, 2013 for planning, design, funding, and construction of upgrades required to meet the proposed limits.

Authority: ARM 17.30.1345(1) and 75-5-402(3), MCA:

This rule and statute require that effluent limits must be established for each outfall and that limitations be clearly specified in the permit. Ammonia limits calculated in this SOB will not be included in this permit because the West Glendive WWTP is not capable of removing ammonia to these levels and the process for upgrading the facility is outside the scope of this five (5) year permit cycle. The proposed ammonia effluent limits will remain in this SOB and provide a basis for ammonia limits during the next permit cycle.

In addition, it is reasonable to postpone TRC and *E.coli* limits to allow the facility time to plan, design, finance and construct a facility while considering all new permits limits (except oil and grease) simultaneously.

#### D. Schedule for Special Conditions

Compliance Schedule	
Milestone	Due Date
Install a primary effluent measuring device.	June 1, 2010
Measure and remove sludge in the lagoon cells, if necessary. Provide a letter documenting this work has been completed.	June 1, 2010
Provide written annual progress reports, beginning December 31, 2010, to the Department explaining progress made in evaluating technologies and options to achieve ammonia, TRC and <i>E.coli</i> bacteria limits.	December 31, 2010
Complete evaluation of technologies and options to achieve proposed ammonia, <i>E. coli</i> bacteria, and TRC limits. Submit final engineering report detailing how and when these limits will be achieved during the next permit cycle.	December 31, 2013

#### VIII. Other Information

On September 21, 2000, a U.S. District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment, the State is not to issue any new permits or increases under the MPDES program. The order was issued in the lawsuit Friends of the Wild Swan v. U.S. EPA, et al. (CV 97-35-M-DWM), District of Montana and Missoula Division.

The Department finds that renewal of this permit does not conflict with Judge Molloy's Order (CV 97-35-M-DVM) because it is not a new permit and the permit does not authorize an increase load or discharge of pollutants.

#### IX. Information Sources

40 CFR, Parts 122, 136, July 1, 2000.

ARM Title 17, Chapter 30, Subchapter 5 - Mixing Zones in Surface and Ground Water.

ARM Title 17, Chapter 30, Subchapter 6 - Surface Water Quality Standards.

ARM Title 17, Chapter 30, Subchapter 7 - Nondegradation of Water Quality.

ARM Title 17, Chapter 30, Subchapter 13 - Montana Pollutant Discharge Elimination System (MPDES) Standards.

DEQ. Circular DEQ 2, Design Standards for Wastewater Facilities. 1999.

DEQ. Circular WQB-7, Montana Numeric Water Quality Standards. January 2004.

DEQ. Montana List of Water bodies in Need of Total Maximum Daily Load Development. 1996.

DEQ. Montana 303(d) List. A Compilation of Impaired and Threatened Water Bodies in Need of Water Quality Restoration. Part A. Water Quality Assessment Results. 2006.

EPA. Office of Water, U.S. EPA NPDES Permit Writers' Manual, EPA-833-B-96-003. December 1996.

Prepared by: John Wadhams  
Date: August 2008

Appendix I. Water quality parameters for determination of ammonia standards for the Yellowstone River (USGS Station 06329500) and side channel of the Yellowstone River January 2000 through May 2007.

Parameter (season/unit)	Number of Samples	Average	Minimum	Maximum	75th percentile
Temperature (°C) Annual	120	12.3	0	26.7	19.2
Temperature (°C) April-Oct	83	17.3	4	26.7	21.3
Temperature (°C) Nov-March	37	1.1	0	8.5	0.2
pH (s.u.) Annual <sup>1</sup>	74	8.3	7.4	8.8	8.6
pH (s.u.) April-Oct	44	8.3	7.6	8.8	8.5
pH (s.u.) Nov-March	30	8.2	7.4	8.8	8.4
Ammonia (mg/L) Annual	35	0.04	0.01	0.23	0.05
<sup>1</sup> Based on 95th percentile of annual data.					

Appendix II. Applicable Ammonia Water Quality Standards for Receiving Water

Condition	Period <sup>(1)</sup>	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard (mg/L) <sup>(4)</sup>
				pH (s.u.)	Temperature °C	
Acute	Annual	No	NA	8.6 <sup>(2)</sup>	19.2	2.65
Chronic	Summer	NA	Yes	8.5 <sup>(3)</sup>	21.3 <sup>(3)</sup>	0.685
Chronic	Winter	NA	Yes	8.4 <sup>(3)</sup>	0.2 <sup>(3)</sup>	1.29
Footnotes: NA – Not Applicable						
(1) Winter period is taken to be November 1 through March 31; summer period is taken to be April 1 through October 31.						
(2) Based on 95 <sup>th</sup> percentile of annual data.						
(3) Based on 75 <sup>th</sup> percentile of values in the applicable period.						
(4) Based on Department Circular DEQ-7 (February 2006)						

## Appendix III

Parameter:	Total Ammonia
Restriction:	January 1 - December 31
Facility:	West Glendive
Permit Number:	MT0021733
Receiving Water:	Yellowstone River side channel
Date:	August 30, 2008

Condition		%	Chronic	Acute	Other
Acute Std, mg/L				2.65	
Chronic Std, mg/L			0.685		
ACR					2.43
Mixing Zone					
7Q10	cfs		5		
Chronic MZ	cfs	100	5		
Acute MZ	cfs	10		0.5	
Effluent Flow	cfs		1.8	1.8	
Water Quality Std.	mg/L		0.685	2.65	
Background Conc.	mg/L		0.04	0.04	
Wasteload Allocation (from mass balance)					
WLA <sub>c</sub>	mg/L		0.685		
WLA <sub>a</sub>	mg/L			2.65	
Long-Term Average -Calc.					
Coeff. Variation (CV)	na				0.6
Percentile	%				95
LTA <sub>c</sub> , multiplier Table 5-1			0.64		
LTA <sub>a</sub> , multiplier Table 5-1				0.47	
LTA <sub>c</sub>	mg/L		0.70		
LTA <sub>a</sub>	mg/L			1.24	
LTA=min(LTA <sub>c</sub> , LTA <sub>a</sub> )	mg/L		0.70	0.70	
AML, multiplier Table 5-2			1.55		
MDL, multiplier Table 5-2				2.13	

	AML	MDL
Final Effluent Limit mg/L	1.1	1.5
Comment: CV=0.6, n=4, p=0.95		

Figure 1 – Sample Location

